

Exhibit 3

ADVANCED ORGANIC CHEMISTRY

REACTIONS,
MECHANISMS, AND
STRUCTURE

FOURTH EDITION

Jerry March

Professor of Chemistry
Adelphi University



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Amino Acids and Esters (continued)
resulting oxime or nitroso compound

2-11 From acyl halides and a dialkyl azodicarboxylate

6-5 Hydrolysis of cyanohydrins

6-16 Reaction between aldehydes, ammonia, and carboxylic acids or esters

6-50 Addition of cyanide and ammonium ions to aldehydes or ketones, followed by hydrolysis (Strecker)

8-14 Reaction between imides and NaOBr (Hofmann)

Amino Carbonyl Compounds0-46 Amination of α -hydroxy ketones

0-47 Transamination of Mannich bases

1-36 Photolysis of acylated arylamines

6-16 Reaction between aldehydes, ammonia, and aldehydes, ketones, or esters (Mannich)

8-13 Rearrangement of ketoxime tosylates (Neber)

8-22 Rearrangement of quaternary ammonium salts (Stevens)

9-23 Oxidation of certain enamines

Amino Ethers

0-18 Alcoholysis of aziridines

5-39 Aminomercuration of alkenes, followed by alcoholysis

6-16 Reaction between aldehydes, amines, and alcohols or phenols (Mannich)

Amino Thiols

0-49 Amination of episulfides

1-9 Sulfurization of aromatic amines (Herz)

6-16 Reaction between an aldehyde, ammonia, and a thiol (Mannich)

Anhydrides

0-27 Reaction of acyl halides with acid salts

0-28 Dehydration of carboxylic acids

0-33 Reaction of acid derivatives with inorganic acids

3-15 From aryl halides and CO

4-11 Acyloxylation of aldehydes

4-31 Reaction between diazonium fluoroborates, CO, and an acid salt

5-5 Addition of carboxylic acids to ketenes

5-22 Free-radical addition of anhydrides to olefins

8-20 Reaction between α -diketones and peroxy compounds (Baeyer-Villiger)

9-10 Oxidation of aromatic rings

Arenes

0-76 Reduction of aryl and benzylic halides

0-78 Hydrogenolysis of benzyl alcohols

0-79 Reduction of benzylic ethers

0-86 Coupling of halides containing aryl groups

0-87 Coupling of aryl halides with organometallic reagents

0-90 Coupling of benzylic alcohols

1-12 Alkylation of aromatic rings (Friedel-Crafts)

1-13 Arylation of aromatic rings (Scholl)

1-22 Diarylation of ketones

1-23 Ring closure of aryl-substituted carbonyl compounds

1-37 Cleavage or rearrangement of alkyl arenes

1-38 Decarbonylation of aromatic aldehydes or deacylation of aromatic ketones

1-39 Decarboxylation of aromatic acids

1-41 Desulfonation of aromatic sulfonic acids

1-42 Dehalogenation of aryl halides

1-44 Hydrolysis of organometallic compounds

2-40 Decarboxylation of α -aryl acids

2-41 Cleavage of tertiary alkoxides

2-45 Cleavage of aryl ketones

2-46 Cleavage of aryl ketones with amide ions (Haller-Bauer)

2-48 Decyanation of aryl nitriles

3-9 Reduction of phenols, phenolic ethers, or phenolic esters

3-10 Reduction of aromatic nitro compounds

3-13 Coupling of organometallic compounds with aryl halides, ethers, and esters

Arenes (c

3-16 Ce

3-17 Al

co

4-18 Fr

sal

Pa

4-21 Fr

4-22 Ph

4-24 R

4-29 Di

4-30 M

4-33 C

4-34 C

4-35 C

co

4-36 R

4-38 C

wi

4-41 D

hy

5-20 A

dr

5-51 Ti

6-29 A

dk

7-36 D

ta

8-30 Pl

pl

9-1 A

ri

9-6 O

9-33 D

9-37 R

9-43 R

Aryl Ha

1-11 H

p

1-35 R

(I

1-39 F

h

1-41 F

h

1-42 M

2-30 F

o

3-8 A

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